Europäisches Patentamt

European Patent Office

Office européen des brevets



(11) **EP 0 929 113 A3**

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3: **28.07.1999 Bulletin 1999/30**

(51) Int. Cl.⁶: **H01P 1/15**, H01P 11/00

(43) Date of publication A2: **14.07.1999 Bulletin 1999/28**

(21) Application number: 98124818.0

(22) Date of filing: 30.12.1998

(84) Designated Contracting States:

AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

Designated Extension States:

AL LT LV MK RO SI

(30) Priority: 06.01.1998 US 3197

(71) Applicant: TRW Inc.

Redondo Beach, California 90278 (US)

(72) Inventors:

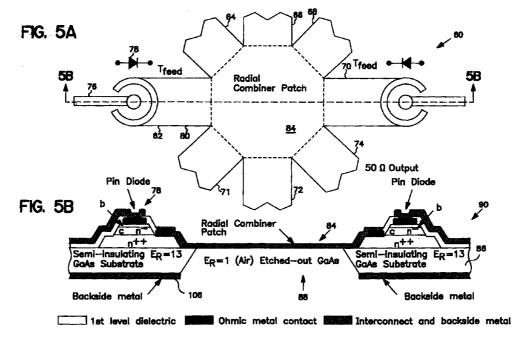
- Kobayashi, Kevin W. Torrance, CA 90503 (US)
- Oki, Aaron K.
 Torrance, CA 90502 (US)
- (74) Representative:

Schmidt, Steffen J., Dipl.-Ing. Wuesthoff & Wuesthoff, Patent- und Rechtsanwälte, Schweigerstrasse 2 81541 München (DE)

(54) Low-loss air suspended radially combined patch for N-way RF switch

(57) A microstrip switch includes N-input switch arms and an output port formed from a microstrip transmission line. Each input switch arm includes one or more p-i-n diodes. The input switch arms as well as the output port are connected at a radially combined center patch. In order to improve the insertion losses at millim-

eter wave frequencies, the center patch is air suspended in order to reduce the parasitic shunt capacitance in order to extend the low pass frequency response of the switch.





EUROPEAN SEARCH REPORT

Application Number EP 98 12 4818

	DOCUMENTS CONSID	ERED TO BE RELEVANT			
Category	Citation of document with it of relevant pass	ndication, where appropriate, sages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)	
A	US 3 597 706 A (KIB * the whole documen		1,2,6-8	H01P1/15 H01P11/00	
A	US 4 525 689 A (WAG 25 June 1985 * column 3, line 4 figure 1 *		1,6-8		
A	28 February 1975	ECOMMUNICATIONS TELEPHONIQUES T.R.T.)	1		
A	US 4 302 734 A (FRO 24 November 1981 * column 3, line 18 figures 1-3,5 *	SCH ET AL.) 3 - column 4, line 35;	1		
Α		R) 14 December 1965 - column 6, line 19;	1	TECHNICAL FIELDS SEARCHED (Int.Cl.6)	
A	APPLICATIONS USING TECHNIQUES" INTERNATIONAL JOURN ELECTRONIC PACKAGIN vol. 18, no. 3, 1 J 217-224, XP00053898	TS FOR HIGH-FREQUENCY MICROMACHINING HAL OF MICROCIRCUITS AND IG, luly 1995, pages 199 and column, line 17 - 1 column, line 30; /	15	H01P	
	Place of search	Date of completion of the search	1	Examiner	
	THE HAGUE	31 May 1999	Den	Otter, A	
X : part Y : part doc A : tecl O : nor	ATEGORY OF CITED DOCUMENTS ticularly relevant if taken alone ticularly relevant if combined with ano unent of the same category nological backgroundwritten disclosure rmediate document	T: theory or principl E: earlier patent do after the filing da	e underlying the curnent, but publi te n the application or other reasons	invention ished on, or	



EUROPEAN SEARCH REPORT

Application Number

EP 98 12 4818

Category	Citation of document with indication of relevant passages	n, where appropriate,	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.6)	
Α	SALZENSTEIN P ET AL: " ON DIELECTRIC MEMBRANES A GAAS SUBSTRATE" ELECTRONICS LETTERS, vol. 32, no. 9, 25 Apri 821/822 XP000595669 * page 821, left-hand c right-hand column, line	MICROMATCHINED 1 1996, page olumn, line 27	IDES 15 ON		
				TECHNICAL FIELDS SEARCHED (int.Cl.6)	
	The present search report has been d				
Place of search THE HAGUE		Date of completion of the se 31 May 1999	ļ	Examiner Otter, A	
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background		T : theory or E : earlier pa after the D : documen L : documen	T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filling date D: document cited in the application L: document cited for other reasons		



Application Number

EP 98 12 4818

CLAIMS INCURRING FEES
The present European patent application comprised at the time of filing more than ten claims.
Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.
LACK OF UNITY OF INVENTION
The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:
see sheet B
All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



LACK OF UNITY OF INVENTION SHEET B

Application Number

EP 98 12 4818

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-14

Radially formed microstrip switch with a combining patch over a hole in the substrate; process for manufacturing such a switch.

2. Claim : 15

Process for manufacturing an air-suspended coplanar waveguide

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 98 12 4818

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31-05-1999

	ent document n search repo		Publication date		Patent family member(s)	Publication date
US 3	597706	A	03-08-1971	BE DE FR GB NL SE	756728 A 2047814 A 2064079 A 1314240 A 7014244 A,B, 364600 B	01-03-19 08-04-19 16-07-19 18-04-19 05-04-19 25-02-19
US 4	525689	Α	25-06-1985	NONE		
FR 2	239820	Α	28-02-1975	NONE		
US 4	302734	Α	24-11-1981	NONE		
US 3.	 223947	A	 14-12-1965	NONE		

FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82